

**PHARMACOGNOSTIC, PHYTOCHEMICAL, PHYSICOCHEMICAL
AND DETAIL MICROSCOPICAL EVALUATION OF *CAPPARIS
ZEYLANICA LINN. LEAVES***

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Article Received on
27 October 2017,
Revised on 17 Nov. 2017,
Accepted on 07 Dec. 2017
DOI: 10.20959/wjpr201717-10414

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ABSTRACT

Capparis Zeylanica Linn. Commonly known as Indian caper is an important medicinal plant. The present study attempt to evaluate the Pharmacognostic, phytochemical, physicochemical and detail microscopical evaluation parameters of *Capparis zeylanica Linn.* leaves belong to family *Caparadaceae* is a climbing shrub found in through out India. The plant is used in folk medicine to treat rheumatism, abdominal ulcers and hernia, swelling, itching, hepatitis, liver tonic, insect poisoning and anti-inflammatory, analgesic, antioxidant, antipyretic and antimicrobial. But there is less work reported on *Capparis zeylanica Linn.* leaves. Physicochemical parameters, preliminary characterization and phytochemical analysis were carried out. There finding will be useful to words establishing quality control parameters for the standardization of the plant material.

KEYWORDS: *Capparis zeylanica Linn.*, Phytochemical screening, Microscopical study.

INTRODUCTION

Capparis zeylanica Linn. (Capparaceae) is a many branched thorny, sub-scandent climbing shrub. Plants are 2-3 m in height, armed with 3-6mm long recurved thorns, branched, leaves are elliptic or broadly lanceolate, base rounded, apex mucronate; flower profuse, pinkish white, later turning pink, berries are globular or elliposide, 3-4 cm in diameter, and seeds are globase, embedded in white pulp. It is grows in moist habitat. The plant distributed through out the major parts of India, Bangladesh and some parts of Pakistan.^[1] *Capparis zeylanica*

Linn. have been used as folk medicine and as ingredient in various Ayurvedic preparations. Traditionally it is use as Antidote to snake bite, to cure swelling of testicle, small pox, boils, cholera, colic, hemiplagia, neuralgia, sores, pneumonic & pleurisy.^[2,5] The whole plant was much more used in traditional as well as in modern era. Whole plant showed the presence of saponin, p-hydroxybenzoic, syringic, vanillic, ferulic and p-coumanic acid. Leaves & seeds showed presence of β -carotene, thioglycoside, glycocapparin, n-tricortane, α -amyrin & fixed oil where as root bark showed presence of an alkaloid, a phytosterol, a water soluble acid and a mucilaginous substance. Pharmacological study revealed Anti-rheumatic, anti-inflammatory & in-vitro antibacterial activities.^[6,7]



Fig. 1: Leaves and flowers of Capparis Zeylanica Linn.



Fig. 2: Three different stages of Leaves.



Fig. 3: Herberium of plant.

Vernacular names

Bengali : Kalokera

English : Ceylon Caper

Gujarati : Govindakal, Kakhbilado, Karrallura

Hindi : Jhiris, Ardanda, Irula, Kevisi kodi

Kannada : Mullukattari

Konkani: Vaghamti

Malayalam : Elippayar, Gitoran, Karthotti

Marathi : Govindi, Kaduvaghanti, Vaghanti

Others

Sanskrit : Vyaghra Nakhi, Tapasapriya, Karambha

Tamil : Karrotti, Suduthoratti, Atontai,

Telugu : Arudonda

Kannada : Arasi

French : Catalpa

Taxonomical Classification

Kingdom: Plantae

Clade: Angiosperms

Clade: Eudicots

Clade: Rosids

Order: Brassicales

Family: Capparaceae

Genus: Capparis

Species: *C. zeylanica*

Part's used – The entire plant leaves, flowers, fruit, bark, stem etc.

MATERIALS AND METHODS

The fresh leaves of *Capparis zeylanica* Linn. (capparaceae), collected at the flowering stages from the most biodiversity area of India at Pune- district, Junnar -Taluka, Maharashtra state where Authenticated by Dr. Mrs. S. S. Rahangdale and the plant a voucher specimen was submitted as herbarium in the Pharmacognosy Department, VJSM's Vishal Institute of Pharmaceutical Education And Research, Ale, Pune412411, Maharashtra-INDIA. The leaves

where dried in shades for 20 days & Then powdered to get a coarse powder & then powder pass through the mesh 40. (Fig.4).



Fig. 4: Extraction Procedure by Soxhlet.

Description

(A) Macroscopic Examination

Botanical description

Macroscopically, the leaf is simple in composition, opposite in arrangement, margin is entire, and average leaf is 7.5 ± 0.9 (length) and 4.6 ± 0.2 (breadth). Fresh leaves are green in colour and characteristics with a slightly bitter taste. The external colour changes from green and pale strips to yellow shades with maturity. It rarely exceeds a height of 5 meters. With 3-6mm long recurved thorns, branched, elliptic or broadly lanceolate leaves, base rounded, apex mucronate; flower profuse, pinkish white, later turning pink, globular or ellipsoidal berries, 3-4 cm in diameters and are globose seeds embedded in white pulp.(Fig.2).

(B) Microscopic Examination

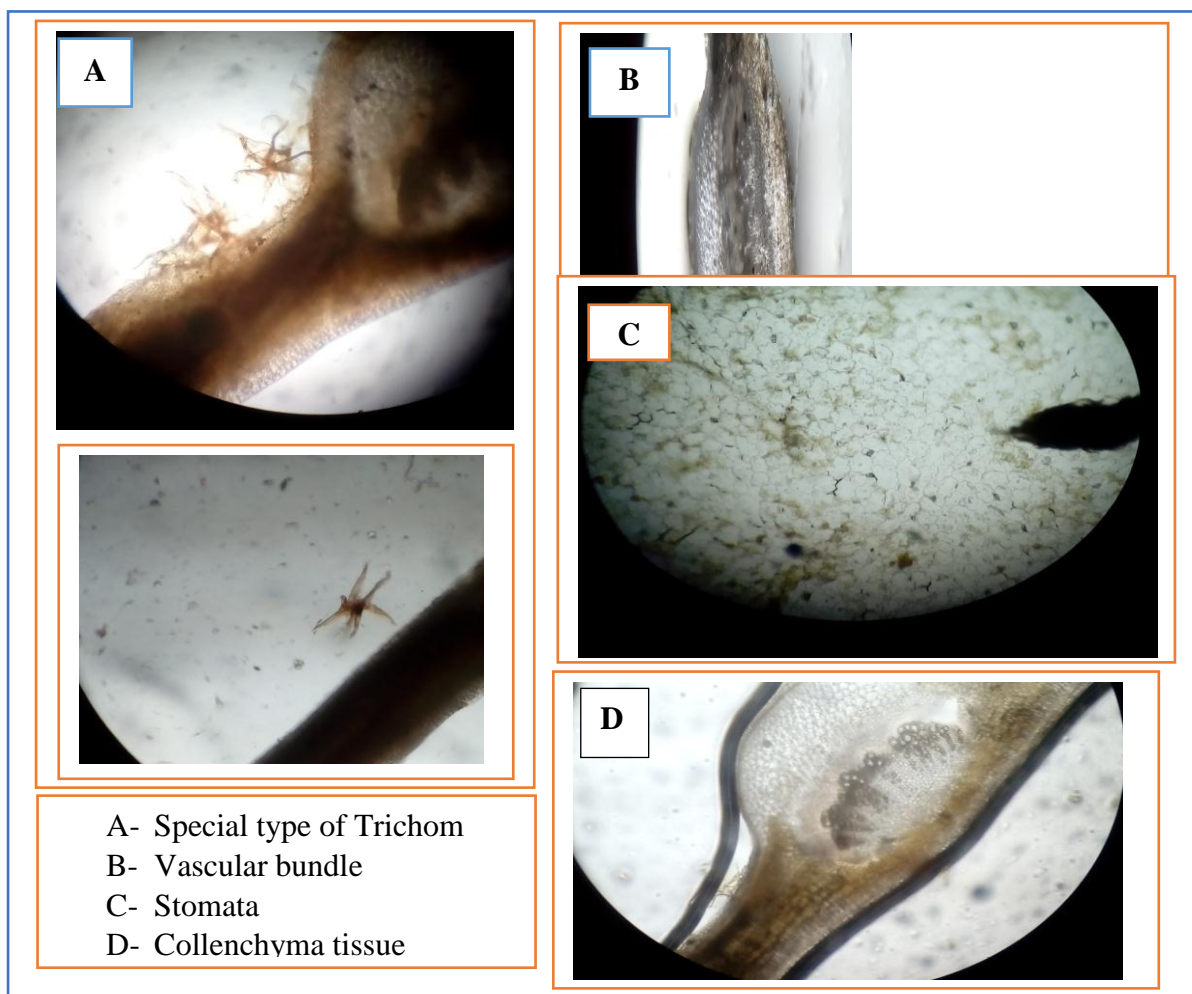
For the study of crystals, starch grains and lignified cells polarized light microscope was employed. Descriptive terms of anatomical features are as given in the standard anatomy books.^[4] (Fig.5).

Table 1: Staining / Diagnosis/ Microchemical Test.

Sr.No.	Reagents	Observations	Characteristics
1	Phloroglucinol +Hcl(1:1)	Pink	Lignified tissues:xylem(vascular bundle)
2	Sudan Red III	Pink	Cutin/cuticle
3	Ruthenium red	Red	Mucilaginous cells of epidermis
4	Sulphuric acid	Needle shape crystals from calcium sulphate are formed.	Calcium oxalate crystals
5	Alcoholic Picric acid	Yellow	Aleurone Grains
6	Iodine	Blue	Starch

Table 2: Quantitative Microscopy.

Sr.No.	Leaf Constant	Mean value
1	Stomatal Index	5.4±0.5
2	Upper Surface	4.9±0.4
3	Lower Surface	15.9±0.5
4	Palisade Ratio	5±1
5	Vein Islet Number	12±1
6	Vein Termination Number	15±2

Fig. 5: Microscopic Examination of Leaves of *Capparis Zeylanica* Linn.

(C) Physico-Chemical Parameter

Crude powdered drug of leaves was used for the determination of various physicochemical parameters such as total ash value, acid insoluble ash value, water soluble ash value, loss on drying, foreign matter, pH, moisture content and extractive values.^[5]

Table 3: Physico-Chemical constant of leaves of *Capparis Zeylanica* Linn.

Sr. No.	Parameter	Observed Value
1	Acid insoluble Ash	1.23%
2	Water insoluble Ash	1.50%
3	Total Ash	4.54%
4	Water extractive value	4.70%
5	Alc extractive value	4.12%
6	Loss on drying	8.98%
7	Inorganic matter	0.100%
8	Swelling index	3.12%

(D) Phytochemical Screening of Leaves extract

The phytoconstituents present in the alcoholic extract of were expressed in the Table: 5
Phytochemical screening procedure.

1) Test for alkaloids

To the extract dilute hydrochloric acid will be added and filtered. The filtrate will be treated with various alkaloid reagents.

a) Mayer's test

The filtrate will be treated with Mayer's reagent: appearance of cream colour indicates the presence of alkaloids.

b) Dragendroff's test

The filtrate will be treated with Dragendroffs reagent: appearance of reddish brown precipitate indicates the presence of alkaloids.

c) Hager's test

The filtrate when treated with Hager's reagent, appearance of yellow colour precipitate indicates the presence of alkaloids.

2) Test for carbohydrates and reducing sugar

The small quantities of the filtrate will be dissolved in 4ml of distilled water and filtered. The filtrate will be subjected to.

a) Molisch's test

A small portion of the filtrate will be treated with Molisch's reagent and sulphuric acid. Formation of a violet ring indicates the presence of carbohydrates.

b) Fehling's test

The extract will be treated with Fehling's reagent A and B. The appearance of reddish brown colour precipitate indicates the presence of reducing sugar.

3) Test for steroids**Liebermann bur chard's test**

The extract will be treated with 3ml of acetic anhydride, few drops of glacial acetic acid followed by a drop of concentrated sulphuric acid. Appearance of bluish green colour indicates the presence of steroids.

4) Test for proteins**a) Biuret test**

The extract will be treated with copper sulphate solution, followed by addition of sodium hydroxide solution; appearance of violet colour indicates the presence of proteins.

b) Millon's test

The extract will be treated with Millon's reagent; appearance of pink colour indicates the presence of proteins.

5) Test for tannins

The extract will be treated with 10% lead acetate solution; appearance of white precipitate indicates the presence of tannins.

6) Test for phenolic compounds

a) The extract will be treated with neutral ferric chloride solution; appearance of violet colour indicates the presence of phenolic compounds.

b) The extract will be treated with 10% sodium chloride solution; appearance of cream colour indicates the presence of phenolic compounds.

7) Test for flavonoids

a) 5ml of extract will be hydrolyzed with 10% sulphuric acid and cooled. Then, it will be extracting with diethyl ether and divided in to three portions in three separate test tubes. 1ml of diluted sodium carbonate, 1ml of 0.1N sodium hydroxide and 1ml of strong ammonia

solution will be added to the first, second and third test tubes respectively. In each test tube. Development of yellow colour demonstrated the presence of flavonoids.

b) Shinoda's test

The extract will be dissolved in alcohol, to which few magnesium turnings will be added followed by concentrated HCL drop wise and heated and appearance of magenta colour shows the presence of flavonoids.

8. Test for gums and mucilage

The extract was treated with 25 ml of absolute alcohol and filtered. The filtrate will be examined for its swelling properties.

9. Test for glycosides

When a pinch of the extract was treated with glacial acetic acid and few drops of ferric chloride solution, followed by the addition of conc. Sulphuric acid, formation of a ring at the junction of two liquids indicates the presence of glycosides.

10. Test for saponins

Foam test

About 1 ml of the extract was diluted to 20 ml with distilled water and shaken well in a test tube. The formation of foam in the upper part of the test tube indicates the presence of saponins.

11. Test for Triterpenoids

The substance was warmed with tin and thionyl chloride. Pink colour indicates the presence of triterpenoids.^[5,6,7,8]

Table 4: Phytochemicals of Extracts of Leaves of *Capparis zeylanica* Linn.

Phytoconstituents	Cold Maceration				Soxhlet Extraction
	Pet.ether	Chloroform	Ethanol	Water	Ethanol
1.Alkaloids	-	-	+	-	+
2.Steroids	+	-	-	-	-
3.saponins	-	-	+	+	+
4.Glycosides	-	+	+	-	+
5.Tannins & Phenolics	+	-	+	+	+
6.Flavanoids	+	-	+	+	+
7. Carbohydrates	-	+	-	+	-
8.Proteins	-	-	+	+	+
9.Terpenoids	-	-	-	-	-

(-)=Absent (+) =Present

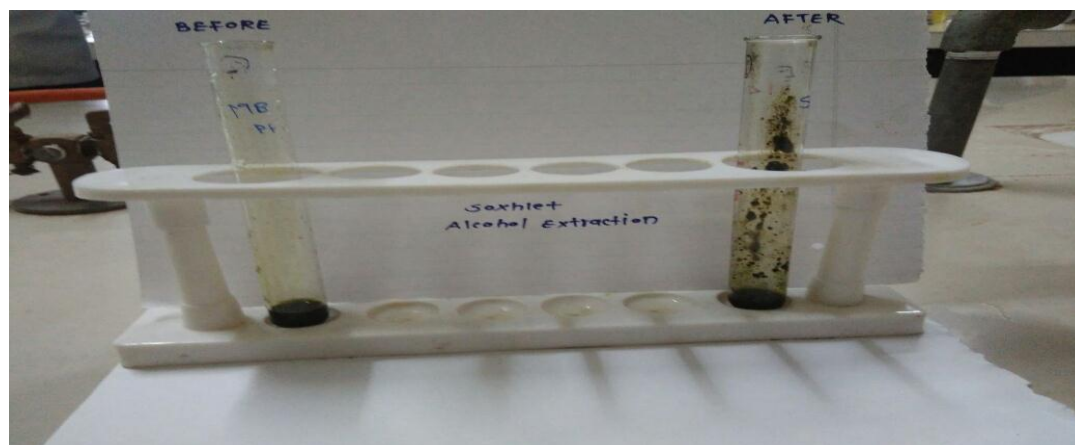


Fig. 6: Phytochemical evaluation of Leaves extract.

RESULT AND DISCUSSION

The above present study gives a modest investigation of leaves of *Capparis zeylanica* Linn. since the leaves of c.z. as the folkore claims have therapeutic quality, the present investigation has laid down a set of anatomical features of leaf which can be employed for its botanical diagnosis. Phytochemical analysis indicated presence of saponins, tannins, alkaloids & flavanoids and in which physical constant evaluation of the drug is an important parameter in detecting adulteration or improper handling of drugs, equally important evaluation of drugs, is ash value & acid insoluble ash value determination. The micro & macro morphological features of leaf described, distinguished. The microscopical evaluation was studied. This could also serve in identification & preparation of monograph on plant. This results of investigation could serve as a basis for proper identification, collection & investigation of plants. Despite the availability of modern techniques, it is more reliable to identify a plant drug by pharmacognostic evaluation. A complete and systematic study of a crude drug which comprises of collection, preservation, storage, macroscopical, microscopical, organoleptic characters, etc. is claimed to be the scientific or pharmacognostic evaluation. Standardization is an essential measure for quality, purity and sample identification. Standardization of herbal drugs is a very challenging task for herbal drug industry because of complex nature and variation of chemical constituents. Microscopical evaluation is one of the simplest methods for identification of drugs. According to WHO, the macroscopic and microscopic evaluation is the first step to be carried out to establish its identity and purity. The evaluation of physico-chemical constants is an important parameter in detecting adulteration or improper handling of drugs. The extractive values are immensely

useful to evaluate the chemical constituents that are present in the crude drug. These extractive values are also helpful in the estimation of specific constituents soluble in particular solvent. is particularly important in the evaluation of purity of drugs. The aim of performing ash value is to remove all traces of organic matter. The total ash value obtained from the study can be used to detect foreign organic matter and adulteration with sand and earth, therefore, reflecting the kind of care that must be taken in preparing the plant for drug and all the evaluation parameter were mention in Table.1-4.

CONCLUSION

The present study attempts a modest comprehensive investigation of the leaves of *Capparis zeylanica*. Since the leaves of *C.zeylanica* as the folklore claims have therapeutic qualities, the present investigation has laid down a set of anatomical features of the leaf which can be employed for its botanical diagnosis. Preliminary phytochemical analysis indicated presence of saponins, tannins, alkaloids and flavonoids which could made the plant useful for treating different ailments as having a potential of providing useful drugs of human use. The present study on physicochemical parameters and preliminary phytochemicals analysis provides importance information which may be help in authentication and adulteration for quality control of row material. The present study adds to the existing knowledge of *Capparis zeylanica* and it will be very useful for development of a formulation for treating various diseases. In this dimension pharmacognostic studies on *Capparis zeylanica* leaf is a substantial step and it further requires long term study to evaluate pharmacological action as well as therapeutic efficacy and toxicity of the leaves to establish as the drug. This could also serve in the identification and preparation of a monograph on the plant. The results of these investigations could serve as a basis for proper identification, collection and investigation of the plant.

ACKNOWLEDGEMENT

We thank our Principal Dr. S.L. Jadhav, Dr. D.D.Gaikwad, Mr. D. K. Gunjal, Mr. S. B. Pingle Sir, Mr. P. K. Dhawade, Mr. P. S. Rahinj and VJSM's Vishal Institute of Pharmaceutical Education And Research, Ale, Pune for providing all the facilities to conduct this work.

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